GSFC JPSS CMO
December 01, 2015
Released

Effective Date: November 17, 2015
Revision C

Joint Polar Satellite System (JPSS) Ground Project
Code 474
474-00448-01-08

Joint Polar Satellite System (JPSS) Algorithm Specification Volume I: Software Requirement Specification (SRS) for Common Geolocation and Spacecraft Orientation

National Aeronautics and
Space Administration

Goddard Space Flight Center
Greenbelt, Maryland

Joint Polar Satellite System (JPSS) Algorithm Specification Volume I: Software Requirement Specification (SRS) for Common Geolocation and Spacecraft Orientation JPSS Review/Approval Page

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Preface

This document is under JPSS Ground Project configuration control. Once this document is approved, JPSS approved changes are handled in accordance with Class I and Class II change control requirements as described in the JPSS Configuration Management Procedures, and changes to this document shall be made by complete revision.

Any questions should be addressed to:

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Change History Log

Revision	Effective Date	Description of Changes (Reference the CCR & CCB/ERB Approve Date)
Rev-	Aug. 29, 2013	This version incorporates 474-CCR-13-1193 which was approved by JPSS Ground ERB on the effective date shown.
A	Jan 30, 2014	This version incorporates 474-CCR-13-1403 which was approved by JPSS Ground ERB on the effective date shown.
A1	Oct 23, 2014	This version incorporates 474-CCR-14-2091 which was approved by the JPSS Ground ERB for CO10 on the effective date shown.
B	Oct 07, 2014	This version incorporates 474-CCR-14-1721, 474-CCR-14-1741, 474-CCR-14-1781, 474-CCR-14-1793 and 474-CCR-14-2012 which was approved by JPSS Ground ERB on the effective date shown.
C	Nov 17, 2015	This version incorporates 474-CCR-14-2110, 474-CCR-15-2452 and 474-CCR-15-2480, 474-CCR-15-2657 and 474-CCR-15-2689 which was approved by JPSS Ground ERB on the effective date shown.

List of TBx Items

TBx	Type	ID	Text	Action
None				

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1 Introduction

The Joint Polar Satellite System (JPSS) is the National Oceanic and Atmospheric Administration's (NOAA) next-generation operational Earth observation program that acquires and distributes global environmental data primarily from multiple polar-orbiting satellites. The program plays a critical role in NOAA's mission to understand and predict changes in weather, climate, oceans and coasts, and the space environment, which support the Nation's economy and protect lives and property. The first JPSS satellite mission, the Suomi National Polar-orbiting Partnership (S-NPP) satellite, successfully launched in October 2011. S-NPP, along with the legacy NOAA Polar Operational Environmental Satellites (POES), provides continuous environmental observations. Two JPSS satellites will follow S-NPP: JPSS-1, planned for launch in fiscal year (FY) 2017, with JPSS-2 to follow in FY2022.

In addition to the JPSS Program's own satellites operating in the 1330 (±10) Local Time of the Ascending Node (LTAN) orbit, NOAA also leverages mission partner assets for complete global coverage. These partner assets include the Department of Defense (DoD) Defense Meteorological Satellite Program (DMSP) operational weather satellites (in the 1730 - 1930 LTAN orbit), the European Organisation for the Exploitation of Meteorological Satellites (EUMETSAT) Meteorological Operational (Metop) satellites (in the 2130 LTAN orbit) and the Japanese Aerospace Exploration Agency (JAXA) Global Change Observation Mission-Water (GCOM-W) satellite (in the 1330 LTAN orbit). JPSS routes Metop data from McMurdo Station, Antarctica to the EUMETSAT facility in Darmstadt, Germany and EUMETSAT, in turn, provides Metop data to NOAA. For GCOM, JPSS routes the GCOM-W data from Svalbard, Norway through the NOAA Satellite Operations Facility (NSOF) in Suitland, MD, processes GCOM-W data and delivers GCOM-W products to the JPSS users who have JAXA permissions.

Additionally, the JPSS Program provides data acquisition and routing support to the DMSP and the WindSat Coriolis Program. JPSS routes DMSP data from McMurdo Station to the 557th Weather Wing at Offutt Air Force Base in Omaha, NE. After processing, the 557th releases the DMSP data for public consumption over the Internet via the National Geophysical Data Center in Boulder, CO. The JPSS Program provides data routing support to the National Science Foundation (NSF), as well as the National Aeronautics and Space Administration (NASA) Space Communications and Navigation (SCaN)-supported missions, which include the Earth Observing System (EOS). As part of the agreements for the use of McMurdo Station, JPSS provides communications/network services for the NSF between McMurdo Station, Antarctica and Centennial, Colorado.

As a multi-mission ground infrastructure, the JPSS Ground System supports the heterogeneous constellation of the before-mentioned polar-orbiting satellites both within and outside the JPSS Program through a comprehensive set of services as listed in Table 1-1.

Table: 1-1 JPSS Ground System Services

Service	Description
Enterprise Management and Ground Operations	Provides mission management, mission operations, ground operations, contingency management and system sustainment
Flight Operations	Provides launch support and early orbit operations, telemetry and commanding, orbital operations, mission data playback, payload support, flight software upgrade, flight vehicle simulation, and disposal at the end of mission life
Data Acquisition	Provides space/ground communications for acquiring mission data
Data Routing	Provides routing of telemetry, mission and/or operations data through JPSS' global data network
Data Product Generation	Provides the processing of mission data to generate and distribute raw, sensor, environmental, and ancillary data products
Data Product Calibration and Validation	Provides calibration and validation of the data products
Field Terminal Support	Provides development and operational support to the Field Terminal customers

1.1 Identification

This volume documents the common software used in the various Sensor Data Record (SDR) geolocation algorithms. It also documents the spacecraft diary and telemetry Raw Data Records (RDRs).

1.2 Algorithm Overview

This volume covers general geolocation requirements and the spacecraft RDRs. Specific geolocation requirements are found within appropriate volumes for the SDRs, VIIRS Imagery for NCC Geo and GTM Geo, Surface Albedo for Net Heat Flux Geo, Cloud Physical Properties for VIIRS Cloud Aggregated Geo, and Aerosols for the Aerosols Geo.

The geolocation algorithm comprises 2 parts: (1) the instrument specific algorithm where the exit vector (or Line-Of-Sight (LOS)) is calculated with respect to the instrument frame, and (2) the common geolocation algorithm that takes the LOS and calculate the interception with the Earth ellipsoid by taking into account the satellite ephemeris and attitude.

1.3 Document Overview

Section	Description
Section 1	Introduction - Provides a brief overview of the JPSS Ground System and the relevant algorithm, as reference material only.
Section 2	Related Documentation - Lists related documents and identifies them as Parent, Applicable, or Information Documents such as, MOAs, MOUs, technical implementation agreements, as well as Data Format specifications. This section also establishes an order of precedence in the event of conflict between two or more documents.
Section 3	Algorithm Requirements - Provides a summary of the science requirements for the products covered by this volume.
Appendix A	Requirements Attributes - Provides the mapping of requirements to verification methodology and attributes.

2 Related Documentation

The latest JPSS documents can be obtained from URL: https://jpssmis.gsfc.nasa.gov/frontmenu_dsp.cfm. JPSS Project documents have a document number starting with 470, 472 or 474 indicating the governing Configuration Control Board (CCB) (Program, Flight, or Ground) that has the control authority of the document.

2.1 Parent Documents

The following reference document(s) is (are) the Parent Document(s) from which this document has been derived. Any modification to a Parent Document will be reviewed to identify the impact upon this document. In the event of a conflict between a Parent Document and the content of this document, the JPSS Program Configuration Change Board has the final authority for conflict resolution.

Doc. No.	Document Title
470-00067	Joint Polar Satellite System (JPSS) Ground System Requirements Document (GSRD)
470-00067-02	Joint Polar Satellite System (JPSS) Ground System Requirements Document (GSRD), Volume 2 - Science Product Specification
474-00448-01	Joint Polar Satellite System (JPSS) Algorithm Specification Volume I: Software Requirements Specification (SRS) for the Common Algorithms

2.2 Applicable Documents

The following document(s) is (are) the Applicable Document(s) from which this document has been derived. Any modification to an Applicable Document will be reviewed to identify the impact upon this document. In the event of conflict between an Applicable Document and the content of this document, the JPSS Program Configuration Change Board has the final authority for conflict resolution.

Doc. No.	Document Title
D0001-M01-S01-004	Joint Polar Satellite System (JPSS) VIIRS Geolocation Algorithm Theoretical Basis Document (ATBD)
474-00448-02-08	Joint Polar Satellite System (JPSS) Algorithm Specification Volume II: Data Dictionary for the Common Geolocation and Spacecraft Orientation
474-00448-04-08	Joint Polar Satellite System (JPSS) Algorithm Specification Volume IV: Software Requirements Specification Parameter File (SRSPF) for the Common Geolocation and Spacecraft Orientation

2.3 Information Documents

The following documents are referenced herein and amplify or clarify the information presented in this document. These documents are not binding on the content of this document.

Doc. No.	Document Title
474-00333	Joint Polar Satellite System (JPSS) Ground System (GS) Architecture Description Document (ADD)
474-00054	Joint Polar Satellite System (JPSS) Ground System (GS) Concept of Operations (ConOps)

Doc. No.	Document Title
470-00041	Joint Polar Satellite System (JPSS) Program Lexicon
474-00448-03-08	Joint Polar Satellite System (JPSS) Algorithm Specification Volume III: Operational Algorithm Description (OAD) for the Geolocation and Spacecraft Orientation
429-05-02-42	Joint Polar Satellite System (JPSS) Mission Data Format Control Book for NPP
472-00251	Joint Polar Satellite System (JPSS) Mission Data Format Control Book for JPSS-1
474-00448-01-02	Joint Polar Satellite System (JPSS) Algorithm Specification Volume I: Software Requirements Specification (SRS) for the ATMS RDR/TDR/SDR
474-00448-01-03	Joint Polar Satellite System (JPSS) Algorithm Specification Volume I: Software Requirements Specification (SRS) for the CrIS RDR/SDR
474-00448-01-04	Joint Polar Satellite System (JPSS) Algorithm Specification Volume I: Software Requirements Specification (SRS) for the OMPS TC RDR/SDR
474-00448-01-05	Joint Polar Satellite System (JPSS) Algorithm Specification Volume I: Software Requirements Specification (SRS) for the OMPS NP RDR/SDR
474-00448-01-06	Joint Polar Satellite System (JPSS) Algorithm Specification Volume I: Software Requirements Specification (SRS) for the VIIRS RDR/SDR
474-00448-01-12	Joint Polar Satellite System (JPSS) Algorithm Specification Volume I: Software Requirements Specification (SRS) for the Aerosols
474-00448-01-16	Joint Polar Satellite System (JPSS) Algorithm Specification Volume I: Software Requirements Specification (SRS) for the Cloud Physical Properties
474-00448-01-20	Joint Polar Satellite System (JPSS) Algorithm Specification Volume I: Software Requirements Specification (SRS) for the Surface Albedo
474-00448-01-26	Joint Polar Satellite System (JPSS) Algorithm Specification Volume I: Software Requirements Specification (SRS) for the VIIRS Imagery

3 Algorithm Requirements

3.1 States and Modes

3.1.1 Normal Mode Performance

SRS.01.08_434 The Common Geolocation algorithm computation shall have a numerical 3-sigma mapping uncertainty of no larger than 10 m when calculating the earth intersection point of an exit vector.

Rationale: The geolocation needs sufficient mapping certainty to meet L1 requirements. This requirement applies to the VIIRS sensor footprint exit vector.

Mission Effectivity: S-NPP, JPSS-1, JPSS-2

SRS.01.08_280 The Common Ground System shall provide the spacecraft diary, when available from the Spacecraft, within 30 seconds of the instrument data for a given data product.

Rationale: Level 1 requirements can't be met with TLE, and IDPS uses TLE if diary does not arrive within 30 seconds of the instrument data. This requirement is subject to the data availability requirements of the JPSS CGSRD (474-00167).

Mission Effectivity: S-NPP, JPSS-1, JPSS-2

3.1.2 Graceful Degradation Mode Performance

SRS.01.08_278 The Geolocation software shall use two-line element sets for spacecraft ephemeris information when spacecraft diary ephemeris and attitude data are missing for a configurable amount of time.

Rationale: If a gap in spacecraft diary data exists for a length of time such that it is not efficient to interpolate data, an alternate data source must be used to obtain ephemeris information. The TLE data is used as a fall-back data when spacecraft diary is missing. Level 1 requirements can't be met with TLE, and IDPS uses TLE if diary is not available for a configurable amount of time.

Mission Effectivity: S-NPP, JPSS-1, JPSS-2

3.2 Algorithm Functional Requirements

3.2.1 Product Production Requirements

Not applicable.

3.2.2 Algorithm Science Requirements

SRS.01.08_267 The Geolocation software shall incorporate a computing algorithm provided for establishing the earth intersect point for a given spacecraft exit vector.

Rationale: Algorithms are established in accordance with D0001-M01-S04, ATBD for VIIRS Geolocation.

Mission Effectivity: S-NPP, JPSS-1, JPSS-2

SRS.01.08_268 The Geolocation software shall incorporate a computing algorithm provided for establishing the spacecraft exit vector for a given instrument exit vector.

Rationale: Algorithms are established in accordance with D0001-M01-S01-004, ATBD for VIIRS Geolocation.

Mission Effectivity: S-NPP, JPSS-1, JPSS-2

SRS.01.08_269 The Geolocation software shall incorporate a computing algorithm provided for establishing the earth intersection of the exit vector relative to the ellipsoid as defined in WGS 84 geodetic reference system.

Rationale: Algorithms are established in accordance with D0001-M01-S01-004, ATBD for VIIRS Geolocation, which uses WGS 84 geodetic reference system.

Mission Effectivity: S-NPP, JPSS-1, JPSS-2

SRS.01.08_270 The Geolocation software shall incorporate a computing algorithm provided for establishing the terrain-corrected earth intersection point of the exit vector.

Rationale: Algorithms are established in accordance with D0001-M01-S01-004, ATBD for VIIRS Geolocation.

Mission Effectivity: S-NPP, JPSS-1, JPSS-2

SRS.01.08_271 The Geolocation software shall incorporate a computing algorithm provided for interpolating spacecraft orientation and ephemeris for all pixels reported in data products.

Rationale: Algorithms are established in accordance with D0001-M01-S01-004, ATBD for VIIRS Geolocation.

Mission Effectivity: S-NPP, JPSS-1, JPSS-2

3.2.3 Algorithm Exception Handling

Not applicable.

3.3 External Interfaces

3.3.1 Inputs

Table 3-1 and Figure 3-1 are best viewed together since they describe the processes governed by this SRS in different ways. The figure diagrams the data flowing into, out of, and within the code governed by this SRS. The table lists these same data interactions as well as all downstream dependencies for outputs from this SRS.

Each row in the table describes a single software interaction - data flowing from one software item to another. The data is listed in the first column. The second and third columns include the collection short name and mnemonic for the data. Blanks indicate there is no mnemonic. The columns for Sending SRS and Receiving SRS contain the SRS that generates the data product(s)

in the first column, and the SRS that receives those products. The columns for Producing Function and Consuming Function contain the actual function name in Algorithm Development Library (ADL) that produces those products, and the function that inputs those products. The SRS's titled "Ingest MSD" and "Store/Retrieve" are non-existent SRS's functioning as data handling for the IDPS. The software functions "Store Products" and "Retrieve Products" are similar non-existent functions that operate as IDPS data handling.

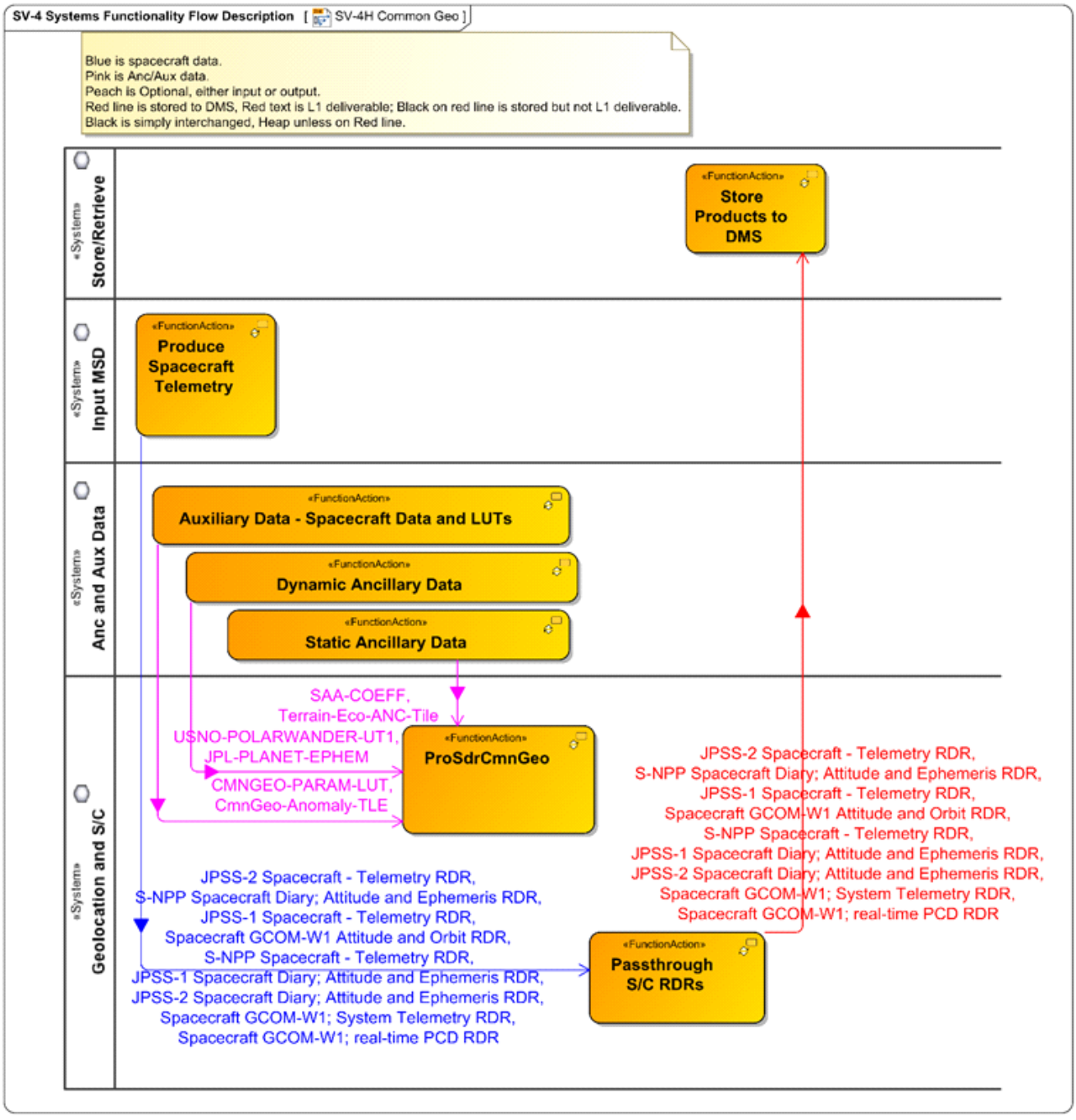

Figure: 3-1 Common Geolocation and Spacecraft Orientation Data Flows

Table: 3-1 Systems Resource Flow Matrix: Common Geolocation and Spacecraft Orientation

Resource Interaction Item	Collection Short Name	Mnemonic	Producing Function	Consuming Function	Sending SRS	Receiving SRS
•Spacecraft GCOM-W1; System Telemetry RDR •Spacecraft GCOM-W1; real-time PCD RDR •JPSS-1 Spacecraft - Telemetry RDR •NPP Spacecraft - Telemetry RDR •NPP Spacecraft Diary; Attitude and Ephemeris RDR •JPSS-1 Spacecraft Diary; Attitude and Ephemeris RDR •Spacecraft GCOM-W1 Attitude and Orbit RDR •JPSS-2 Spacecraft Diary; Attitude and Ephemeris RDR •JPSS-2 Spacecraft - Telemetry RDR	•SPACECRAFT-SYSTM-RDR •SPACECRAFT-RTPCD-RDR •SPACECRAFT-TELEMETRY-RDR •SPACECRAFT-TELEMETRY-RDR •SPACECRAFT-DIARY-RDR •SPACECRAFT-DIARY-RDR •SPACECRAFT-ATTORBIT-RDR •SPACECRAFT-DIARY-RDR •SPACECRAFT-TELEMETRY-RDR	•RDRE-SCGW-C0033 •RDRE-SCGW-C0034 •RDRE-SCTN-C0031 •RDRE-SCTP-C0031 •RDRE-SCAE-C0030 •RDRE-SCAE-C0031 •RDRE-SCGW-C0035 •RDRE-SCAE-C0032 •RDRE-SCTN-C0032	Produce Spacecraft Telemetry	Passthrough S/C RDRs	Input MSD	Common Geolocation and S/C
•USNO-Polarwander-UT1 •JPL-Planet-Ephem	•USNO-PolarWander-UT1-ANC •Planet-Eph-ANC	•AN_NP-L10330-003 •AN_NP-L10340-001	Dynamic Ancillary Data	ProSdrCmnGeo	Anc and Aux Data	Common Geolocation and S/C
•CmnGeo-Param-LUT •CmnGeo-Anomaly_TLE	•CMNGEO-PARAM-LUT •TLE-AUX-Int	•NP_NU-LM0233-215 •None	Auxiliary Data - Spacecraft Data and LUTs	ProSdrCmnGeo	Anc and Aux Data	Common Geolocation and S/C
•Terrain-Eco-ANC-Tile •SAA-Coeff	•Terrain-Eco-ANC-Tile •CmnGeo-SAA-AC	•AN_NP-L10100-003 •	Static Ancillary DataDynamic Ancillary Data	ProSdrCmnGeo	Anc and Aux Data	Common Geolocation and S/C
•Common Geo Outputs	•None	•None	ProSdrCmnGeo	ProSdrOmpsNpEarth	Common Geolocation and S/C	OMPS NP RDR/SDR

Resource Interaction Item	Collection Short Name	Mnemonic	Producing Function	Consuming Function	Sending SRS	Receiving SRS
•Common Geo Outputs	•None	•None	ProSdrCmnGeo	ProSdrOmpsNpCal	Common Geolocation and S/C	OMPS NP RDR/SDR
•Common Geo Outputs	•None	•None	ProSdrCmnGeo	ProSdrOmpsTcEarth	Common Geolocation and S/C	OMPS TC RDR/SDR
•Common Geo Outputs	•None	•None	ProSdrCmnGeo	ProSdrOmpsTcCal	Common Geolocation and S/C	OMPS TC RDR/SDR
•Common Geo Outputs	•None	•None	ProSdrCmnGeo	ProSdrAtmsRemap	Common Geolocation and S/C	ATMS RDR/SDR/TDR
•Common Geo Outputs	•None	•None	ProSdrCmnGeo	ProSdrCris	Common Geolocation and S/C	CrIS RDR/SDR
•Common Geo Outputs	•None	•None	ProSdrCmnGeo	ProSdrAtms	Common Geolocation and S/C	ATMS RDR/SDR/TDR
•Common Geo Outputs	•None	•None	ProSdrCmnGeo	ProSdrViirsCal	Common Geolocation and S/C	VIIRS RDR/SDR
•Common Geo Outputs	•None	•None	ProSdrCmnGeo	ProSdrViirsGeo	Common Geolocation and S/C	VIIRS RDR/SDR
•Spacecraft GCOM-W1; System Telemetry RDR •Spacecraft GCOM-W1; real-time PCD RDR •JPSS-1 Spacecraft - Telemetry RDR •NPP Spacecraft - Telemetry RDR •NPP Spacecraft Diary; Attitude and Ephemeris RDR	SPACECRAFT-SYSTM-RDR •SPACECRAFT-RTPCD-RDR •SPACECRAFT-TELEMETRY-RDR •SPACECRAFT-TELEMETRY-RDR •SPACECRAFT-DIARY-RDR	•RDRE-SCGW-C0033 •RDRE-SCGW-C0034 •RDRE-SCTN-C0031 •RDRE-SCTP-C0031 •RDRE-SCAE-C0030 •RDRE-SCAE-C0031 •RDRE-SCGW-C0035 •RDRE-SCAE-C0032	Passthrough S/C RDRs	Store Products to DMS	Common Geolocation and S/C	Store/Retrieve

Resource Interaction Item	Collection Short Name	Mnemonic	Producing Function	Consuming Function	Sending SRS	Receiving SRS
•JPSS-1 Spacecraft Diary; Attitude and Ephemeris RDR •Spacecraft GCOM-W1 Attitude and Orbit RDR •JPSS-2 Spacecraft Diary; Attitude and Ephemeris RDR •JPSS-2 Spacecraft - Telemetry RDR	•SPACECRAFT-DIARY-RDR •SPACECRAFT-ATTORBIT-RDR •SPACECRAFT-DIARY-RDR •SPACECRAFT-TELEMETRY-RDR	•RDRE-SCTN-C0032				

3.3.2 Outputs

SRS.01.08_272 The JPSS RDR software shall generate the JPSS-1 Telemetry RDR for health and status data from mission data packet APIDs specified in the JPSS Algorithm Specification Vol IV: SRSPF for the Common Geolocation and Spacecraft Orientation (474-00448-04-08) <RDR><JPSS-1_Telemetry>.

Rationale: Spacecraft telemetry RDR is produced from established APIDs for the spacecraft health and status.

Mission Effectivity: JPSS-1

SRS.01.08_283 The JPSS RDR software shall generate the JPSS-2 Telemetry RDR for health and status data from mission data packet APIDs specified in the JPSS Algorithm Specification Vol IV: SRSPF for the Common Geolocation and Spacecraft Orientation (474-00448-04-08) <RDR><JPSS-2_Telemetry>.

Rationale: Spacecraft telemetry RDR is produced from established APIDs for the spacecraft health and status.

Mission Effectivity: JPSS-2

SRS.01.08_273 The JPSS RDR software shall generate the JPSS-1 Spacecraft Diary RDR for spacecraft attitude and ephemeris data from mission data packet APIDs specified in the JPSS Algorithm Specification Vol IV: SRSPF for the Common Geolocation and Spacecraft Orientation (474-00448-04-08) <RDR><JPSS-1_Diary>.

Rationale: APIDs 0, 8, and 11 are part of the Spacecraft Diary which is included in the deliverable RDR.

Mission Effectivity: JPSS-1

SRS.01.08_438 The JPSS RDR software shall generate the JPSS-2 Spacecraft Diary RDR for spacecraft attitude and ephemeris data from mission data packet APIDs specified in the JPSS Algorithm Specification Vol IV: SRSPF for the Common Geolocation and Spacecraft Orientation (474-00448-04-08) <RDR><JPSS-2_Diary>.

Rationale: Spacecraft diary RDR is produced from established APIDs for the spacecraft attitude and ephemeris.

Mission Effectivity: JPSS-2

SRS.01.08_274 The S-NPP RDR software shall generate the S-NPP Telemetry RDR for health and status data from mission data packet APIDs specified in the JPSS Algorithm Specification Vol IV: SRSPF for the Common Geolocation and Spacecraft Orientation (474-00448-04-08) <RDR><S-NPP_Telemetry>.

Rationale: Spacecraft telemetry RDR is produced from established APIDs for the spacecraft health and status.

Mission Effectivity: S-NPP

SRS.01.08_275 The S-NPP RDR software shall generate the S-NPP Spacecraft Diary RDR for spacecraft attitude and ephemeris data from mission data packet APIDs specified in the JPSS Algorithm Specification Vol IV: SRSPF for the Common Geolocation and Spacecraft Orientation (474-00448-04-08) <RDR><S-NPP_Diary>.

Rationale: APIDs 0, 8, and 11 are part of the Spacecraft Diary which is included in the deliverable RDR.

Mission Effectivity: S-NPP

SRS.01.08_276 The GCOM-W RDR software shall generate the GCOM-W System Telemetry RDR for health and status data from mission data packet APIDs specified in the JPSS Algorithm Specification Vol IV: SRSPF for the Common Geolocation and Spacecraft Orientation (474-00448-04-08) <RDR><GCOM-W_Telemetry>.

Rationale: APID 1281 is included in the deliverable RDR.

Mission Effectivity: GCOM-W1

SRS.01.08_439 The GCOM-W RDR software shall generate the GCOM-W Real-time PCD RDR for Real-time PCD Supplemental data from mission data packet APIDs specified in the JPSS Algorithm Specification Vol IV: SRSPF for the Common Geolocation and Spacecraft Orientation (474-00448-04-08) <RDR><GCOM-W_PCD_Supplemental >.

Rationale: APID 1550 is included in the deliverable RDR.

Mission Effectivity: GCOM-W1

SRS.01.08_277 The GCOM-W1 RDR software shall generate the GCOM-W1 Spacecraft Attitude and Orbit RDR for spacecraft attitude and orbit data from mission data packet APIDs specified in the JPSS Algorithm Specification Vol IV: SRSPF for the Common Geolocation and Spacecraft Orientation (474-00448-04-08) <RDR><GCOM_Diary>.

Rationale: APID 1549 is included in the deliverable RDR.

Mission Effectivity: GCOM-W1

3.4 Science Standards

Not applicable.

3.5 Metadata Output

Not applicable.

3.6 Quality Flag Content Requirements

Not applicable.

3.7 Data Quality Notification Requirements

Not applicable.

3.8 Adaptation

Not applicable.

3.9 Provenance Requirements

Not applicable.

3.10 Computer Software Requirements

Not applicable.

3.11 Software Quality Characteristics

Not applicable.

3.12 Design and Implementation Constraints

Not applicable.

3.13 Personnel Related Requirements

Not applicable.

3.14 Training Requirements

Not applicable.

3.15 Logistics Related requirements

Not applicable.

3.16 Other Requirements

Not applicable.

3.17 Packaging Requirements

Not applicable.

3.18 Precedence and Criticality

Not applicable.

Appendix A. Requirements Attributes

The Requirements Attributes Table lists each requirement with CM-controlled attributes including requirement type, mission effectivity, requirement allocation(s), block start and end, method(s) for verifying each requirement, etc.

Req ID	Requirement Text	Level 3 Type	Product Type	Mission Effectivity	Allocated To	Block Start	Block End	Block 2.0.0 VM	Block 2.1.0 VM
SRS.01.08_434	The Common Geolocation algorithm computation shall have a numerical 3-sigma mapping uncertainty of no larger than 10 m when calculating the earth intersection point of an exit vector.	P	GEO	S-NPP JPSS-1 JPSS-2	algorithm provider	2.0.0	3.0.0	Test	NA
SRS.01.08_280	The Common Ground System shall provide the spacecraft diary, when available from the Spacecraft, within 30 seconds of the instrument data for a given data product.	Pi	GEO	S-NPP JPSS-1 JPSS-2	CGS	2.0.0	3.0.0	Inspection	NA
SRS.01.08_278	The Geolocation software shall use two-line element sets for spacecraft ephemeris information when spacecraft diary ephemeris and attitude data are missing for a configurable amount of time.	G	GEO	S-NPP JPSS-1 JPSS-2	CGS	2.0.0	3.0.0	Inspection	NA
SRS.01.08_267	The Geolocation software shall incorporate a computing algorithm provided for establishing the earth intersect point for a given spacecraft exit vector.	Ap	GEO	S-NPP JPSS-1 JPSS-2	algorithm provider	2.0.0	3.0.0	Inspection	NA
SRS.01.08_268	The Geolocation software shall incorporate a computing algorithm provided for establishing the spacecraft exit vector for a given instrument exit vector.	Ap	GEO	S-NPP JPSS-1 JPSS-2	algorithm provider	2.0.0	3.0.0	Inspection	NA

Req ID	Requirement Text	Level 3 Type	Product Type	Mission Effectivity	Allocated To	Block Start	Block End	Block 2.0.0 VM	Block 2.1.0 VM
SRS.01.08_269	The Geolocation software shall incorporate a computing algorithm provided for establishing the earth intersection of the exit vector relative to the ellipsoid as defined in WGS 84 geodetic reference system.	Ap	GEO	S-NPP JPSS-1 JPSS-2	algorithm provider	2.0.0	3.0.0	Inspection	NA
SRS.01.08_270	The Geolocation software shall incorporate a computing algorithm provided for establishing the terrain-corrected earth intersection point of the exit vector.	Ap	GEO	S-NPP JPSS-1 JPSS-2	algorithm provider	2.0.0	3.0.0	Inspection	NA
SRS.01.08_271	The Geolocation software shall incorporate a computing algorithm provided for interpolating spacecraft orientation and ephemeris for all pixels reported in data products.	Ap	GEO	S-NPP JPSS-1 JPSS-2	algorithm provider	2.0.0	3.0.0	Inspection	NA
SRS.01.08_272	The JPSS RDR software shall generate the JPSS-1 Telemetry RDR for health and status data from mission data packet APIDs specified in the JPSS Algorithm Specification Vol IV: SRSPF for the Common Geolocation and Spacecraft Orientation (474-00448-04-08) <RDR><JPSS-1_Telemetry>.	F	RDR	JPSS-1	CGS	2.0.0	2.0.0	Inspection	NA
SRS.01.08_283	The JPSS RDR software shall generate the JPSS-2 Telemetry RDR for health and status data from mission data packet APIDs	F	RDR	JPSS-2	CGS	3.0.0	3.0.0	Demonstration	

Req ID	Requirement Text	Level 3 Type	Product Type	Mission Effectivity	Allocated To	Block Start	Block End	Block 2.0.0 VM	Block 2.1.0 VM
	specified in the JPSS Algorithm Specification Vol IV: SRSPF for the Common Geolocation and Spacecraft Orientation (474-00448-04-08) <RDR><JPSS-2_Telemetry>.								
SRS.01.08_273	The JPSS RDR software shall generate the JPSS-1 Spacecraft Diary RDR for spacecraft attitude and ephemeris data from mission data packet APIDs specified in the JPSS Algorithm Specification Vol IV: SRSPF for the Common Geolocation and Spacecraft Orientation (474-00448-04-08) <RDR><JPSS-1_Diary>.	F	RDR	JPSS-1	CGS	2.0.0	2.0.0	Inspection	NA
SRS.01.08_438	The JPSS RDR software shall generate the JPSS-2 Spacecraft Diary RDR for spacecraft attitude and ephemeris data from mission data packet APIDs specified in the JPSS Algorithm Specification Vol IV: SRSPF for the Common Geolocation and Spacecraft Orientation (474-00448-04-08) <RDR><JPSS-2_Diary>.	F	RDR	JPSS-2	CGS	3.0.0	3.0.0	Inspection	NA
SRS.01.08_274	The S-NPP RDR software shall generate the S-NPP Telemetry RDR for health and status data from mission data packet APIDs specified in the JPSS Algorithm Specification Vol IV: SRSPF for	F	RDR	S-NPP	CGS	2.0.0	3.0.0	Inspection	NA

Req ID	Requirement Text	Level 3 Type	Product Type	Mission Effectivity	Allocated To	Block Start	Block End	Block 2.0.0 VM	Block 2.1.0 VM
	the Common Geolocation and Spacecraft Orientation (474-00448-04-08) <RDR><S-NPP_Telemetry>.								
SRS.01.08_275	The S-NPP RDR software shall generate the S-NPP Spacecraft Diary RDR for spacecraft attitude and ephemeris data from mission data packet APIDs specified in the JPSS Algorithm Specification Vol IV: SRSPF for the Common Geolocation and Spacecraft Orientation (474-00448-04-08) <RDR><S-NPP_Diary>.	F	RDR	S-NPP	CGS	2.0.0	3.0.0	Inspection	NA
SRS.01.08_276	The GCOM-W RDR software shall generate the GCOM-W System Telemetry RDR for health and status data from mission data packet APIDs specified in the JPSS Algorithm Specification Vol IV: SRSPF for the Common Geolocation and Spacecraft Orientation (474-00448-04-08) <RDR><GCOM-W_Telemetry>.	F	RDR	GCOM-W1	CGS	2.0.0	3.0.0	Inspection	NA
SRS.01.08_439	The GCOM-W RDR software shall generate the GCOM-W Real-time PCD RDR for Real-time PCD Supplemental data from mission data packet APIDs specified in the JPSS Algorithm Specification Vol IV: SRSPF for the Common Geolocation and Spacecraft	F	RDR	GCOM-W1	CGS	2.0.0	3.0.0	Inspection	NA

Req ID	Requirement Text	Level 3 Type	Product Type	Mission Effectivity	Allocated To	Block Start	Block End	Block 2.0.0 VM	Block 2.1.0 VM
	Orientation (474-00448-04-08) <RDR><GCOM-W_PCD_Supplemental >.								
SRS.01.08_277	The GCOM-W1 RDR software shall generate the GCOM-W1 Spacecraft Attitude and Orbit RDR for spacecraft attitude and orbit data from mission data packet APIDs specified in the JPSS Algorithm Specification Vol IV: SRSPF for the Common Geolocation and Spacecraft Orientation (474-00448-04-08) <RDR><GCOM_Diary>.	F	RDR	GCOM-W1	CGS	2.0.0	3.0.0	Inspection	NA